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Capturing and Using Traffic Operations Data

from research to reality

BRIEF

RESEARCH DEVELOPMENT & TECHNOLOGY TRANSFER

In the course of operating Intelligent Transportation Systems (ITS) projects and facilities around the state, WisDOT accrues lots of data in digital format. Data pours in from ramp meters, traffic loops registering vehicle counts and speeds, and computerized intelligence systems collecting environmental data. All of this information is generated daily, and in some locations around the clock. It forms a data pool teeming with facts, figures and conditions that could be harvested for a variety of traffic and safety analyses, and for real-time transportation operations.

What's the Problem?

For the most part, this raw data is simply stored as it is generated. It is not managed, sorted or evaluated for other uses. WisDOT wants to begin considering how this data could be housed, manipulated and gleaned for use, and who could be using it. To postpone the development of an effective data archiving/management process entails serious risks: wasted data, lost opportunities for financially beneficial public-private partnerships, and frustrated efforts to evaluate ITS projects and programs.

Research Objectives

Recognizing these needs, the investigators conducted a research study with several goals:

- Provide a literature and best practices scan of ITS data archiving and management in the U.S.;
- Articulate the relevance of good and complete data collection to transportation operations and management;
- Provide examples of users who can benefit from data, what types of data they would like, and what benefits can accrue if they obtain the quality data they seek;
- Propose goals and objectives for developing a Wisconsin ITS data archiving/management model.

Research Results

Case studies reveal a variety of beneficial applications for well-managed data, including: microscopic traffic simulation; pavement and bridge performance modeling; map query interface using 3-D graphics software; emergency response time planning; and traffic incident analysis. The stakeholders are also diverse, and include transportation researchers, traffic management operators, emergency management services, and private sector users such as information service providers and carriers.

The scan identified the building blocks for an effective archiving/management system. The preliminary system architecture includes data storage, database construction, access to data and an easy-to-use query interface. End users are able to query through PDAs, workstations, Web browsers and other suitable tools.

Current data collection/archiving practices in the U.S. include: loop detector data from freeways in Arizona, California, Illinois, Michigan, Minnesota, Texas, Washington and Wisconsin; and loop detector data from arterials in Arizona, California and Maryland. Commercial vehicle and weather data are being collected by Kentucky. Elsewhere, Texas and New York/New Jersey/Connecticut (TRANSCOM) collect travel times derived from Automatic Vehicle Identification (AVI)-equipped vehicles. Texas also gathers incident management data.

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Archiving and management involve the harvesting of useful data, warehousing it offline, segmenting it into smaller data marts and making it available to users through a variety of interfaces.

"The 14 case studies reviewed in this research enabled us to identify clearly the likely data sources and potential consumers of the data. We can now move toward developing a management and archiving model for Wisconsin traffic operations data."

- John Corbin, WisDOT State Traffic Engineer

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ITS Data Management and Archiving: A Literature and Best Practices Scan

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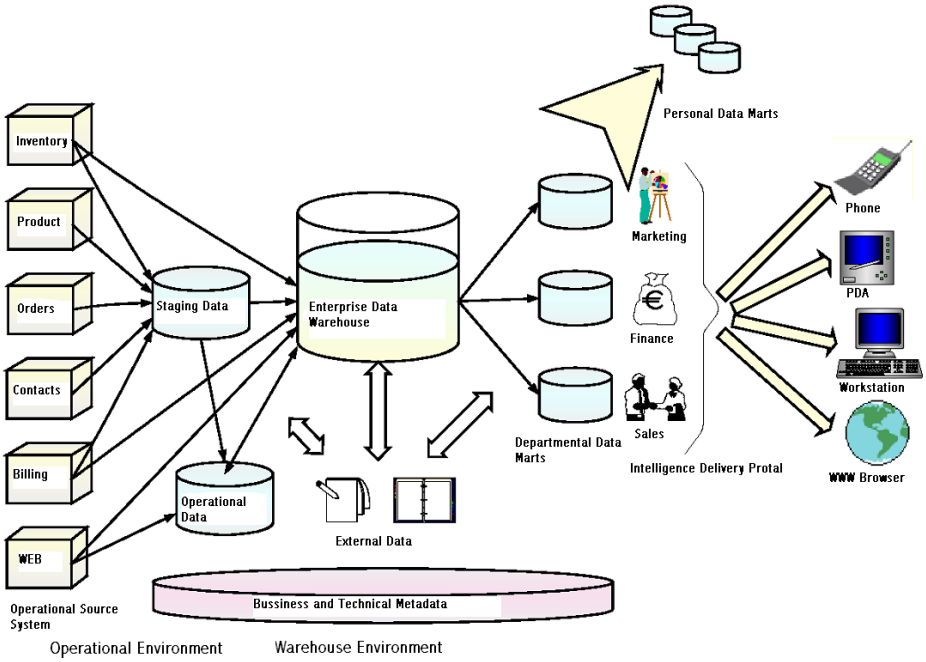

The report identifies the freeway Performance Measurement System (PeMS) as a good working model for a system that is collecting, archiving *and* managing data. PeMS is sponsored by Caltrans and developed by Partners for Advanced Transit and Highways (PATH). PeMS obtains 30-second loop detector data in real time, archives it, and manages the data for extraction in various forms by users, such as transportation managers, transportation engineers, travelers, travel Web sites and planners/researchers.

Implementation

Recommended approaches to ITS data archiving/management include collaboration with the MONITOR Traffic Operations Center in metropolitan Milwaukee. MONITOR currently collects freeway data through electronic detectors, closed circuit TV cameras, ramp meters and variable message signs. Subsequent stages of the implementation plan could be incorporated into WisDOT's budgeting, staffing and contracting plans.

The new data archiving/management system would play an important role in the development of Wisconsin's ITS architecture and the Advanced Traveler Information System (ATIS). Many of the existing and planned ITS projects in the state have ATIS components. Wisconsin's long-term vision for ATIS is that a mix of public- and private-sector entities will deliver quality information to travelers in the state to make travel safer, more efficient, and increase customer satisfaction. WisDOT's vision for the statewide ITS architecture is to provide a framework for the development of ITS systems in the state that will allow disparate systems to be integrated and interoperated. The secondary goal is to conform to the national ITS architecture developed by USDOT in 1998.

Benefits

A data archiving/management system would provide immediate and long-term benefits to drivers and transportation staff. With the ability to summon and compare real-time and historical ITS data, transportation planners and managers would be able to make better decisions today and over time. Transportation managers, for example, could use the system to improve freeway performance. Maintenance personnel would also benefit: the system could provide quick access to winter road conditions data for highways and bridges.

For more information

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